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## **An Evaluation to the Three-Layer ECRM&CRM Performance in Banking Sector, in Order to Help Anti-Money Laundering Systems**

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### **Abstract**

Nowadays many businesses have realized the importance of customer relationship systems to help the potential of it to gain new customers, keep old customers, adding value to their products and services by a more effective communication. With further development of information technology, customer relationships is also very important in the field of financial since many of the finance and banking transactions done via internet and physically presence of customers are not required. This situation provides an opportunity for banks to use the implementation of efficient systems of customer relationship to attract customers and gain a competitive advantage over competitors. On the other way, having anti-fraud and anti-money laundering systems, is an important issue for banks and governments that cause normal and secure economic – financial cycle as well as a wide range of trusted clients (large or small, domestic or foreign, etc). For an optimal performance of these systems, we need to have some basic information that are properly collected and analyzed. In this article we have tried to evaluate a number of ECRM&CRM criteria in our banking system and further be investigate which of these criteria might be more effective for use in anti-fraud and anti-money laundering systems to be used later in these systems.

**Keywords:** customer relationship management, system, bank, anti-money laundering, performance.

### **Introduction**

In recent decades along with, economic globalization, liberalization of international capital flows, the development of electronic banking, innovation and deployment of new tools in electronic funds transfer at the international level, money laundering is also facilitated. Launderers often move their networks to countries that have weak financial systems or countries that do not make effective action against money laundering. Since

banks are the core protection networks of the financial systems, the anti-money laundering system performance largely depends on bank efforts in the fight against money laundering.

Banks are among the organizations that interact directly with customers, so to analyze customer behavior is important, to increase their loyalty. In recent years, with increasing availability of customer data and the improved capabilities of data analysis using intelligent methods, various activities have been carried out in order to analyze customer behavior. One of these activities is the use of intelligent systems in detecting bank frauds. There are a wide range of banking frauds causing financial and intellectual losses to banks and their customers.

Due to the directly and indirectly high cost of fraud, Banks and financial institutions aggressively seek to accelerate and speed in identifying crooks and fraudsters activities. This is due to its direct effect on customer service of these institutions to reduce operating costs and remain as a reputable and reliable provider of financial services.

The indirect loss of fraudsters makes to the banking and insurance industry, is a figure that is much higher than that, they are directly affected. In recent years, the U.S. financial markets, with disclosures of several fraudulent practices by some companies, have seriously damaged. World com, Enron, Adelphia are only a small number of financial scandals that led into the stock market fluctuate and the loss of public trust. On the other hand, the scandal caused irreparable losses on investment and competition has eliminated them. Many of these scandals have hurt to savings, retirement benefits, college education, and the future security (Albrecht, Albrecht, & Albrecht, 2008).

One of the important things that can cut down on bank fraud and money laundering is customer behavior analysis in customer relationship management systems that through it, we can obtain a model for the behavior of customers. For an optimal anti-money laundering system, we must first have the appropriate preliminaries and basic information; the first step should be a proper infrastructure to be provided. In this paper we try to investigate the status of customer relationship management systems in banks to properly identify the strengths, weaknesses and gaps in the field of customer relationship management systems. The next step is strengthened the factors that help for the creation of integrated AML systems.

### **Literature Review**

Bank fraud is the use of potentially illegal means to obtain money, assets, or other property owned or held by a financial institution, or to obtain money from depositors by fraudulently posing as a bank or other financial institution (Sacramento Bee. 1995).

There are different types of bank fraud, which money laundering is also one of these cases and defined as follows:

Money laundering means to legitimize the illegal and illegitimate ways to make money

illegally obtained such that the origin is not specified and hide in the financial process.

### **Methods of Money Laundering**

The methods of money laundering are complex and varied. These methods depend on factors such as the type, the kind of economic system and state laws, and regulations of the country where the money is laundered. The most common method of money laundering is that the offender has established various companies for their illegal transfer of money or proceed to spend this kind of money to various economic affairs like construction works, investments in various financial markets (banks, exchanges, etc.), various engineering services, etc. The easiest way to lose the attention of law enforcement to money laundering is a large amount of cash converted to small amounts of it. This amount will be deposited directly in a bank or financial instruments such as promissory notes, stocks, bonds ... purchased and then invested in other places.

In recent decades due to development of financial products and services offered, complicated financial communications, advancement of technology and increasing global monetary velocity, money laundering methods are much more advanced. However, in general, money laundering methods can be classified in three various categories:

1. Laundering through the banking system and credit institutions,
2. Laundering through non-bank financial institutions,
3. Laundering through the non-financial activities and financial institutions.

In every way, the money laundering can be done in different ways (Keshtkar, 2011).

### **Money Laundering through the Banking System and Accredited Institutions**

The banking system is one of the most important vehicles for money laundering. The complexity and international nature of the banking system allows money launderers to hide their illegal funds. The criminals use the banks to transfer the funds securely, quickly and with the appearance of legitimacy. In this respect, banking system can also provide them to convert funds into various products and move away from predicate offences. But the use of banks has been made more difficult in a number of countries by the introduction of anti-money laundering measures such as suspicious or significant cash reporting requirements and the disallowing of false names or anonymous accounts (Sarigul, 2013).

The most important ways through which money laundering and violations of banking systems and financial institutions are done, included the followings:

- Significant amounts of deposits and their transactions,
- Open bank accounts with false names,
- Opening accounts shared with family and friends
- The use of Travel Checks
- Use of telephone bills
- Use of collective accounts<sup>1</sup>

- Recruitment of banks under the influence of offenders
- Use of payable through accounts<sup>2</sup>
- Use of Correspondent Bank<sup>3</sup> and Correspondent Account<sup>4</sup>
- The use of electronic and Internet banking accounts
- The use of collateral in bank loans
- The use of offshore banking and financial institutions (Keshtkar, 2011).

### **Equipping a Standard Report System and Report of Suspected Cases to Competent Authorities**

In general, to implement effective anti-money laundering program, all financial institutions should be equipped with a reporting system. The system that designed based on predetermined rules and standards. This means that the system must be defined and specified based on criteria and attributes that transactions considered suspicious. The system should be adjusted according to the important characteristics and then controls workflow operations of the customers automatically. If the system recognizes the risk criteria, will automatically be alert and warn. In this respect, it is necessary for all banks and financial institutions, to have a control and implementation unit. The department is responsible for implementing of the banks and institutions actions with anti-money laundering laws and regulations. Besides a section for the control and detection of suspected cases are needed. In addition, existence of proper reporting system along with recording, keeping and reporting of suspicious cases are the main requirements of the success in combating money laundering.

The following will be discussed about the benefits of ECRM&CRM in the banking system briefly, Then the effects of these systems and the way that they can help to information needed for anti-money laundering systems, will be discussed.

### **ECRM&CRM Benefits in Banking Industry**

According to Onut, Erden, & Hosver (2008), the idea of CRM is that it helps businesses use technology and human resources gain insight into the behavior of customers and the value of those customers. If it works as hoped, a business can provide better customer service, make call centers more efficient, cross sell products more effectively, help sales staff close deals faster, simplify marketing and sales processes, discover new customers, and increase customer revenues.

The use of ECRM and information technology reduces the transaction cost for organizations by providing customers with ATM cards and other business services. Many authors suggest that the implementation of ECRM practices and improves the profit margins for banking industries (Kardaras & Papathanassiou, 2001). According to Burnham (1996), for long-term sustainability, it is important for banks to adopt electronic banking

practices, thereby reducing operational costs and increasing customer satisfaction. Orr (1998) speculated that those banks that lag behind in adapting ECRM practices surely lose their customers. Almost every developed country has adopted ECRM practices, but Pakistan is lagging behind in terms of adopting these practices efficiently (Shahzada, 2006). According to Mols (1998), electronic banking reduces transaction times, but more profit can be secured if more customers were made aware of the technology. Therefore, the major issue is the customer's readiness to adopt and accept new technologies.

### **Using of CRM&ECRM Systems to Prevent Frauds**

Banks handle the CRM process in a technical way, by collecting the information about their customers from data warehouse and customer meetings, the information includes the market position of the customer (business), the management, what type of contracts the customers are signing in and how much, what type of credit the customer wants (Dyche, 2001).

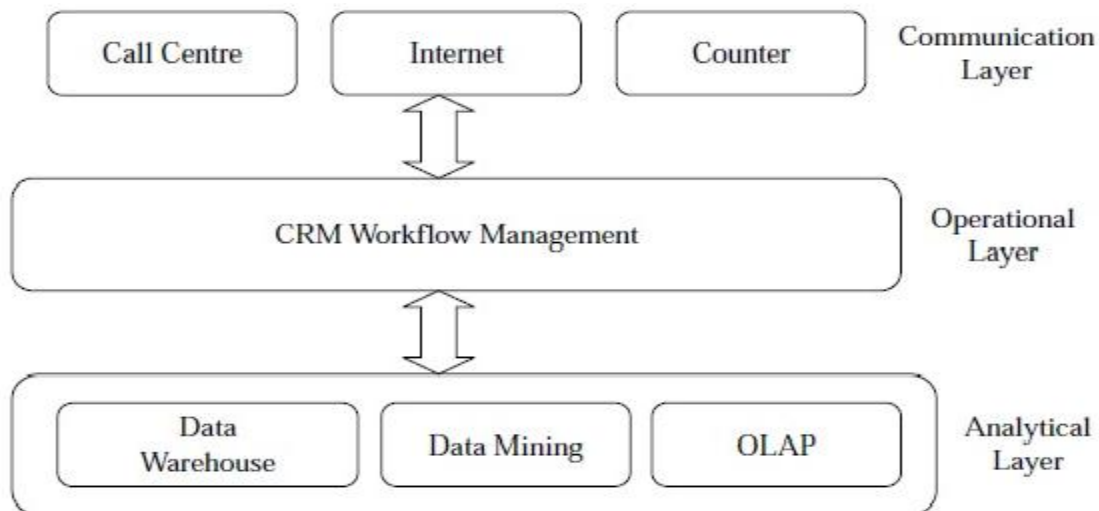
Banks are using following technology softwares to interact with its customers:

Call center automation, Contact management, Data warehousing, Campaign management, Knowledge management, Field service management, Marketing automation, Sales service automation, personalization

The bank views CRM technology as customer-centric process which can help us to automate the whole processes otherwise it is impossible to handle all the information manually (Saymote & Natu, 2011).

CRM systems in the banking industry varies in different countries but now one of the most common structures, is the three-layer CRM. In following, an example of this structure of China banks is presented.

Currently, the structure of CRM application in Chinese commercial banks can be categorized as three layers – communication, operational, and analytical layers (Figure 1) (Jiang, 2004).



*Figure 1. The structure of CRM application in Chinese commercial bank.*

- Communication layer provides contact methods between staff counter and customer.
- Operational layer is the daily operation platform for marketing officer to conduct optimal combination and produce feedback of business lines such as sales, marketing, and customer service.
- Analysis layer provides in-depth analysis on customer background information, transaction history record, communication information, assists back-office staff to process large-volume of data analysis and make marketing strategy, including customer background analysis, customer consumption pattern, customer categorization, customer revenue and risk analysis, and product revenue and marketing analysis(Li & Li, 2006).

CRM system is highly promoted by all levels of administrative management within a commercial bank as CRM can assist in analysis of customers' consumption tendency and operational risk, and detecting current and potential customers who are making or will make profit for the banks.

Most of the banks and financial institutions worldwide anti-money laundering procedures use the methods and applications that consider the process of financial operations, examines the principles and rules for financial operations and if a special case has not been accordance with the rules defined for the software, it is reported as a risk. This approach requires strong database for optimal performance based on that, analyze customer data and financial processes then disclose suspected cases.

## Objectives

One of the critical issues for banks is the existence of comprehensive systems such as customer relationship systems to collect useful and needed information and be used as a prerequisite for anti-money laundering systems. It is also necessary to specify that what

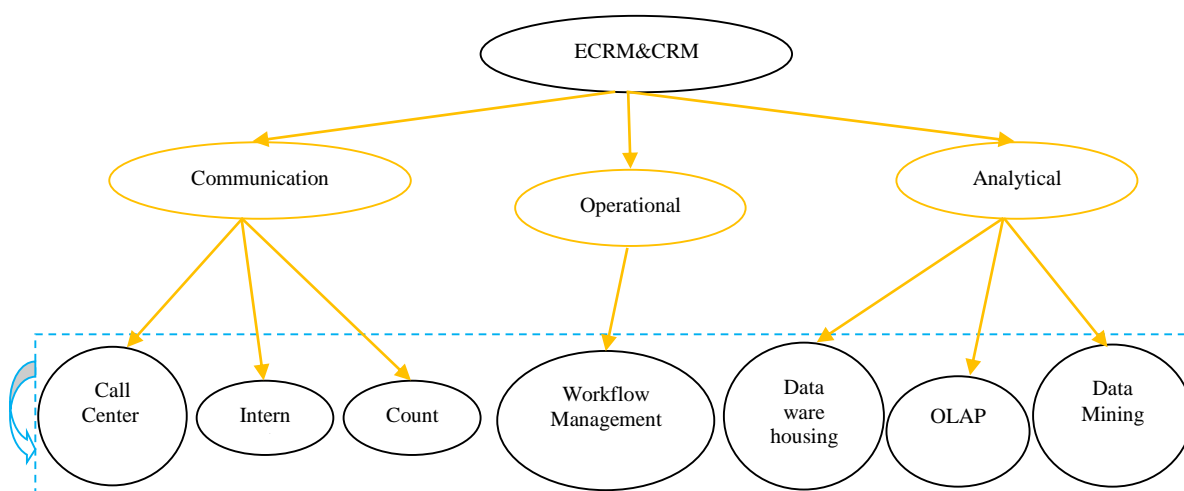
information of ECRM&CRM systems is necessary to assist the effective AML systems. We should strengthen these important factors; use them in anti-money laundering systems.

The purpose of this study is to evaluate the importance of the ECRM&CRM factors based on three-layer model, to assist information that is used for anti-money laundering systems. In fact, we want to investigate that from the various criteria and sub-criteria in the three-layer customer relationship systems structure, which factors are more important for anti-money laundering systems. Then evaluate that criteria in the next step to clear up the status of these factors in customer relationship management systems in order to create or based on desired improvements.

## Method

### Research Model

Our proposed model for this study is based on three-layer model of customer relationships management, which is structured as follows:



According to the model, Fuzzy AHP and Fuzzy DEMATEL techniques are used, based on the following three parts:

1. By using Fuzzy AHP, adaptation rate and the importance of main criteria is obtained,
2. The Fuzzy DEMATEL uses to investigate the intensity and significance of factors, also the effect of relationship between their internal components,
3. Finally, by combining these two techniques, the weight of criteria with respect to goal is achieved.

### Measures

As the model is specified, this study has three main criteria (communication, operational and analytical) and 7 sub criteria that a brief description of them is given in the

following table:

Table 1

*Components of the Research*

Main Criteria	Subs	Definitions
Communication	Call Center	A call center is a physical place where customer and other telephone calls are handled by an organization, usually with some amount of computer automation.
	Internet	The focus of all the process of the CRM base on the Internet
	Counter	Outermost layer of customer relationship, in terms of both physical and virtual
Operational	Workflow Management	Workflow Management lets you streamline the sales, marketing, and support processes.
Analytical	Data Warehouse	A computerized database composed of data extracted from the data processing and accounting systems used for various bank deposits, loan, and other customer products.
	OLAP	A category of software tools that provides analysis of data stored in a database. OLAP tools enable users to analyze different dimensions of multidimensional data.
	Data Mining	Obtaining information about customers or groups of customers from a data warehouse for marketing or other purposes.

## Data Collection

Two types of questionnaires were used for this model that ECRM approach is considered:

1. A paired comparison questionnaire to fuzzy AHP,
2. Fuzzy DEMATEL questionnaires to evaluate the interrelationships of criteria

The questionnaires were distributed among specialists in this field in the positions of president or Vice president of the bank branches either public or private and in three various cities of Iran: Tehran, Isfahan and Hamadan; The results are described in the next section.

## Results & Findings

### Fuzzy AHP for Main Criterion

In order to achieve the purpose of the survey, paired comparisons questionnaires were distributed among experts. Due to the phased approach in the study, the linguistics term and fuzzy numbers are used. To calculate the compatibility, the Gvgvs and Butchers method



(1998) has been used in order to check the consistency, the two resulted matrices (middle number of fuzzy number) derived from the consistency procedure were calculated based on hourly method. After the computational procedures and obtaining the weight vector and the largest values of the matrix and calculating the inconsistency rate of CR (CI index into the random index RI) on two matrices on the basis of their relations they were compared with the initial value 0.1 that in this study were consistent. The next step, normalized by the geometric mean of the values of Z are normalized using the following equation:

$$\tilde{r}_{ij} = \tilde{w}_i = \frac{\tilde{z}_i}{\sum_{i=1}^n \tilde{z}_i} \quad (1)$$

The combined weight of the items (relative to the criteria) and criteria weights according to Equation 2, the final weight is calculated:

$$\tilde{U}_i = \sum_{j=1}^n \tilde{w}_j \tilde{r}_{ij} \quad \forall i \quad (2)$$

And finally, according to equation (3), the weights are defuzzed.

$$Crisp(\tilde{U}) = \frac{(u_l + 2 \times u_m + u_r)}{4} \quad (3)$$

With this calculation, the final weights were obtained following table:

Table 2

*Final Weight Matrix Main Criteria with Respect to Goal*

The Final Decisive Weight Components	The Final Fuzzy Weight	Component
0.376	(0.186,0.348,0.622)	Communication
0.251	(0.127,0.229,0.419)	Operational
0.462	(0.24,0.422,0.766)	Analytical

### Fuzzy DEMATEL

DEMATEL that is a variety of methods to make decisions based on paired comparisons show the mutual influence affected by components with the benefit of the judgment of experts in the extraction of a systematic restructuring them, so that the intensity of these relationships and their importance will be given in a numerical score.

In this study to investigate the aim, 7 different components are used, their names are listed in the following table.

Table 3

*Names of Components*

No	Symbol	Title
1	C <sub>1</sub>	Call Center
2	C <sub>2</sub>	Internet
3	C <sub>3</sub>	Counter
4	C <sub>4</sub>	Workflow Management
5	C <sub>5</sub>	Data Warehousing
6	C <sub>6</sub>	OLAP
7	C <sub>7</sub>	Data Mining

Besides, in order to compare measures with each other, 5 verbal expressions have been used. The following terms and equivalent fuzzy values are shown in the following table.

Table 4

*Verbal Expressions Used in Research and Their Equivalent Amounts*

Fuzzy Value	verbal expressions
(1.000,1.000,1000)	No effect
(2.000,3.000,4.000)	Very low Impact
(4.000,5.000,6.000)	Low Impact
(6.000,7.000,8.000)	High Impact
(8.000,9.000,10.000)	Very High Impact

To evaluate the criteria, the opinion of 35 experts are used. In order to consider the opinion of all experts, the arithmetic means are used by the formula.

$$\tilde{z} = \frac{\tilde{x}^1 \oplus \tilde{x}^2 \oplus \tilde{x}^3 \oplus \dots \oplus \tilde{x}^p}{p} \quad (4)$$

In this formula, P is the number of experts, and  $\tilde{x}^1, \tilde{x}^2, \dots, \tilde{x}^p$  are respectively, paired comparison matrix Expert 1, Expert 2 and Expert P.  $\tilde{z}$  is the triangular Fuzzy number as  $\tilde{z}_{ij} = (l'_{ij}, m'_{ij}, u'_{ij})$  then normalized the matrices of comments of all experts. Then the total Fuzzy relationship matrix was calculated according to the following formula

$$T = \lim_{k \rightarrow +\infty} (\tilde{H}^1 \oplus \tilde{H}^2 \oplus \dots \oplus \tilde{H}^k) \quad (5)$$

The next step is to obtain the rows and columns of the matrix T. Rows and columns make according to formulas 8 and 9.

$$\tilde{D} = (\tilde{D}_i)_{n \times 1} = [\sum_{j=1}^n \tilde{T}_{ij}]_{n \times 1} \quad (6)$$

$$\tilde{R} = (\tilde{R}_i)_{1 \times n} = [\sum_{i=1}^n \tilde{T}_{ij}]_{1 \times n} \quad (7)$$

Finally, the importance of the parameters ( $\tilde{D}_i + \tilde{R}_i$ ) (and the relationship between measures ( $\tilde{D}_i - \tilde{R}_i$ ) are specified. If  $\tilde{D}_i - \tilde{R}_i > 0$ , then the measure of the impact is its effectiveness and if  $\tilde{D}_i - \tilde{R}_i < 0$ , then the relevant criterion is its effectiveness. The following table, shows the final DE Fuzzy  $\tilde{D}_i + \tilde{R}_i$  and  $\tilde{D}_i - \tilde{R}_i$  shows.

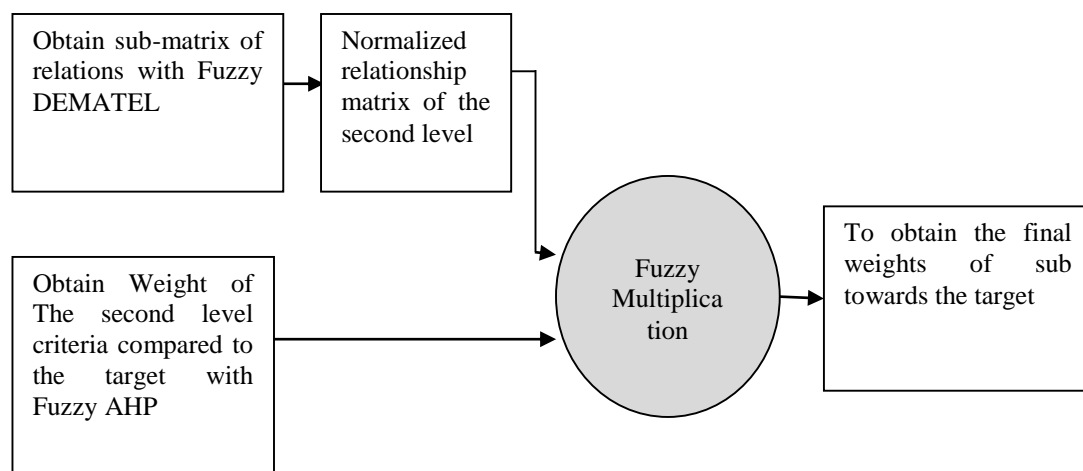
Table 5

*Significance and Impact Measures (Absolute Numbers)*

Criterion	$(\tilde{D}_i + \tilde{R}_i)^{def}$	$(\tilde{D}_i - \tilde{R}_i)^{def}$
Call Center	8.789	-1.390
Internet	9.971	-0.534
Counter	9.925	-0.399
Workflow Management	10.375	-0.026
Data Warehousing	10.215	0.714
OLAP	10.108	0.679
Data Mining	9.821	0.613

### The Combination of Fuzzy AHP and Fuzzy DEMATEL

The combination of previous cases and obtain the final result can be modeled as follows:



By obtaining of sub-matrix relations and normalizing it, also respect to the target and paired comparisons, the weight of each second-level criteria (sub) compared with the target is in the following table.

Table 6

*Weight Sub towards the Target*

Criteria	Target
Call Center	(0.012,0.035,0.113)
Internet	(0.041,0.135,0.429)
Counter	(0.053,0.178,0.553)
Workflow Management	(0.061,0.169,0.477)
Data Warehousing	(0.069,0.209,0.62)
OLAP	(0.019,0.051,0.159)
Data Mining	(0.055,0.162,0.504)

Finally, with multiplication of Fuzzy DEMATEL matrix and second level fuzzy AHP, The final weights of the second level criteria, according to the goal and relations of internal sub criteria is shown in the next table.

Table 7

*The Final Weights of the Second Level Criteria*

Criteria	The Final Fuzzy Weight	The Final Definite Weight
Call Center	(0.016,0.094,0.725)	0.23225
Internet	(0.02,0.118,0.905)	0.29025
Counter	(0.019,0.117,0.912)	0.29125
Workflow Management	(0.022,0.13,0.99)	0.318
Data Warehousing	(0.023,0.136,1.026)	0.33025
OLAP	(0.024,0.138,1.037)	0.33425
Data Mining	(0.022,0.131,0.99)	0.3185

### Discussion

Based on the findings section, discussion can be expanded into three separate sections:

1. According to the final weight gained in the first part of the findings (Table 2), according to the experts, to use of ECRM&CRM information in order to assist anti-money laundering systems, first the analytical layer, then communication and at the end the operational level is important. Therefore, to design and implement appropriate anti-money laundering system, it is better that based on these ranking, evaluate these levels and improve them by different ways.

2. According to Table 5, significance and influencing factors and affected factors are as follows:

Order of importance as follows:

Workflow Management, Data Warehousing, OLAP, Internet, Data Mining, Counter, Call Center

It should be noted that the analytical criteria (Data Warehousing, OLAP, and Data Mining) are influenced and others are influenced by other factors. Therefore, considering these points, the third result is reached.

3. By combining the results of previous parts of this section, the sub towards the research objective is achieved that according to Table 7 again shows the importance of analytical layer sub-criteria compared with the other two layers. In this section, the workflow management is more important than communication layer factor due to the less affected by this element than the elements of communication layer.

Since, according to the experts, the analytical layer is more important than the rest of layers and this layer includes: Data Warehousing, OLAP and Data Mining, it can be concluded that there is a need to look further into ECRM approach because the analytical layer, is relevant to Customer Relationship Management applications and suggest improvements in the IT field. This shows the opportunities and threats in this area for banks that can be used with proper management of opportunities and threats thwarted.

### **Conclusion**

Banks are among the organizations that interact directly with customers. So the analysis of customer behavior to increase their loyalty is very important. Customer relationship management in the banking industry can help to maintain existing customers and to attract new customers. However, based on the experience of different countries in combating money laundering, establishment of effective systems to identify the customer by banks and credit institutions and monitor financial activities of customers is the most effective weapon for combating money laundering and violators. In addition, having these security systems, will lead into more customers trust and satisfaction. Thus, we can create optimum customer relationship systems, take two advantages simultaneously: Satisfy more customers and use of this information to prevent frauds and money laundering. It should be noted that with the advancement of information technology, it is necessary that the strategy of the system be an Internet-based (ECRM), also prioritize improving the design of related software to take advantage of theses issue like: Comfort and safety, less time, more trust of our customers, saving the country resources and etc.

### **Endnote**

1. Collection Accounts often used by immigrants to European countries and USA. Using the account, the money will be transferred to their home country. The fraudsters also use these accounts to transfer funds between their countries.
2. Payable through Accounts are price sensitive visual accounts that foreign banks and companies open with a U.S. bank and serve their foreign customers through these accounts.
3. Correspondent Bank is an overseas Bank on behalf of the principal bank.

4. Correspondent Account is a bank account abroad that a bank or financial institution open in foreign country and deposit in it, also do the payments from this account to trading partners abroad. The opener can do financial account transactions for the benefit of others by this account.

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